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## (54) MANUFACTURE OF RECORDING PAPER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide the method for producing a recording paper having a void type recording layer, in which neither liquid gathering nor ununiformity occurs and the development of a film defect such as a fine crack or the like is suppressed.

SOLUTION: Two or more water-based coating compositions, which do not substantially include gelatin and the viscosity at 40° C of which is 10-100 cP and that at 15° C of which is at least 20 or more times as much as that at 40° C, are simultaneously coated on a support. The preferable water-based coating composition includes void-forming fine particles, a hydrophilic binder and the water.

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CLAIMS

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[Claim(s)]

[Claim 1] The manufacture approach of the record form which it is the drainage system spreading constituent which does not contain gelatin substantially, and the viscosity in 40 degrees C is 10 - 100cp, and is characterized by the viscosity in 15 degrees C carrying out coincidence spreading of the two or more drainage system spreading constituents with at least 20 or more-time viscosity in 40 degrees C on a base material.

[Claim 2] The manufacture approach of a record form of having the opening mold recording layer which it is the drainage system spreading constituent which contains a non-subtlety particle, polyvinyl alcohol and a boric acid, or its salt, and does not contain gelatin substantially, and the viscosity in 40 degrees C is 10 - 100cp, and is characterized by the viscosity in 15 degrees C carrying out coincidence spreading of the two or more drainage system spreading constituents with at least 20 or more-time viscosity in 40 degrees C on a base material.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] About the manufacture approach of a record form, especially this invention does not cause a spreading defect, and does not have liquid Yori, and it is uniform and is in offering the manufacture approach of the opening mold record form which can form a spreading film surface without nonuniformity efficiently.

[0002]

[Description of the Prior Art] In recent years, image quality of ink jet record is improving quickly, and photograph image quality is pressed for it. In order to attain such image quality by ink jet record, ED is progressing also from the field of a record form, and although the record form which prepared the ink absorption layer which has a minute opening on the base material of the Takahira slippage is the closest to photograph image quality, it is being set to one from it being high ink absorptivity and high drying.

[0003] By the way, generally base materials which do not absorb ink, such as a paper base material covered with polyester film, a polyolefine film, or polyolefine, are used as a Takahira slippage base material. In preparing the opening layer of ink absorptivity in such a non-ink absorptivity base material, it is necessary to prepare the opening layer of the thickness which is sufficient for absorbing sufficient quantity of ink. Usually, when applying an opening layer on such a non-ink absorptivity base material, 30 micrometers or more will be preferably applied by thickness 35 micrometers or more as desiccation thickness.

[0004] In applying the desiccation thickness of an opening layer by 30 micrometers or more, it usually applies at least 100 micrometers or more by 130 micrometers or more as humid thickness of coating liquid.

[0005] As a trouble in the case of applying drainage system coating liquid on a base material by such thick humid thickness, there are a lifting and a cone fault about the nonuniformity by that desiccation takes time amount and liquid Yori at the time of desiccation.

[0006] Since the water which is the main solvents of a water solution has the high boiling point, in case it is made to dry only by heat-treatment, it needs the remarkable long drying time and a huge desiccation zone.

[0007] On the other hand, while it is dry over such long time amount, liquid runs by various causes locally, and the applied liquid wakes up the so-called liquid Yori, and becomes an uneven spreading film surface. When liquid Yori occurs, a paint film side not only becomes an ununiformity, but there is [ whether it is a lifting and ] no part which became thick about the trouble on a lifting and manufacture serious when rolled round in poor desiccation.

[0008] As an example which applies drainage system coating liquid by thick humid thickness, spreading of the silver halide photographic emulsion which uses gelatin as a hydrophilic binder is mentioned. Although a gelatin water solution is generally in a water-solution condition above about 30 degrees C, there is a property to gel below 20-25 degrees C. The water solution which contains gelatin using this property is applied on a base material, and after carrying out cooling gelation, a wind with comparatively strong low temperature (about 20-60 degrees C) can be sprayed, and it can dry.

[0009] Therefore, in the case of the application which can use gelatin, the problem accompanying the drying time is not generated, but if gelatin is used as main hydrophilic binders, in the case of the coating liquid used for opening mold ink jet record form creation, in order that ink may make gelatin swell and may take up an opening immediately in the case of ink jet record, the description as an opening cannot be harnessed, and gelatin cannot be used for it.

[0010] Although a certain amount of above-mentioned technical problem improves by adjusting the viscosity of coating liquid in order to create an opening mold ink jet record form using the drainage system coating liquid which does not contain gelatin substantially, the new technical problem of being easy to generate the defect of coats, such as a minute crack, occurs only from a viewpoint of coating liquid viscosity.

[0011] Gelatin is not used substantially and the technique which moreover applies the opening layer of thick thickness to homogeneity for high productivity is not yet known.

[0012]

[Problem(s) to be Solved by the Invention] Therefore, the technical problem of this invention is to offer the approach of creating the record form which has the opening mold recording layer by which the fault of the spreading film surface by liquid Yori and nonuniformity was canceled, and generating of the defect of coats, such as a minute crack, was suppressed.

[0013]

[Means for Solving the Problem] The above-mentioned technical problem of this invention is attained by the following configurations.

[0014] 1) The manufacture approach of a record form that it is the drainage system spreading constituent which does not contain gelatin substantially, the viscosity in 40 degrees C is 10 - 100cp, and viscosity in 15 degrees C is characterized by carrying out coincidence spreading of the two or more drainage system spreading constituents with at least 20 or more-time viscosity in 40 degrees C on a base material.

[0015] 2) The manufacture approach of a record form of having the opening mold recording layer which it is the drainage system spreading constituent which contains a non-subtlety particle, polyvinyl alcohol and a boric acid, or its salt, and does not contain gelatin substantially, and the viscosity in 40 degrees C is 10 - 100cp, and is characterized by the viscosity in 15 degrees C carrying out coincidence spreading of the two or more drainage system spreading constituents with at least 20 or more-time viscosity in 40 degrees C on a base material.

[0016] By this invention, there is not liquid Yori, it is uniform and the record form which has the opening mold recording layer which there is no nonuniformity and has a spreading film surface with few defects of coats, such as a minute crack, can be manufactured efficiently.

[0017] Hereafter, this invention is explained to a detail. Although the drainage system spreading constituent which does not contain the gelatin concerning this invention substantially means not containing gelatin as a main constituent of the constituent concerned, it may be a constituent which does not specifically contain gelatin at all, and may be a constituent in which the operation which takes up the opening of the opening mold recording layer of this invention is hardly shown and which is included a grade.

[0018] As for the drainage system spreading constituent concerning this invention, it is desirable that it is what contains at least the particle, the hydrophilic binder, and water which set opening formation as the main purpose.

[0019] The particle which can contain the drainage system spreading constituent concerning this invention is a non-subtlety particle preferably. For example, precipitated calcium carbonate, whiting, a magnesium carbonate, A kaolin, clay, talc, a calcium sulfate, a barium sulfate, a titanium dioxide, A zinc oxide, zinc hydroxide, zinc sulfide, zinc carbonate, a hydrotalcite, Aluminum silicate, the diatom earth, a calcium silicate, a magnesium silicate, White inorganic pigments, such as synthetic amorphous silica, colloidal silica, an alumina, a colloidal alumina, pseudo-boehmite, an aluminum hydroxide, a lithopone, a zeolite, and a magnesium hydroxide, etc. can be mentioned.

[0020] Such a non-subtlety particle can also be used, where you could use with the primary particle and secondary floc is formed. In the viewpoint that the drainage system coating liquid in which the viscosity concerning this invention is shown can be formed easily, especially the thing



for which the particle silica compounded by the gaseous-phase method as a non-subtlety particle is used is desirable.

[0021] The diameter of a primary particle obtained by burning at an elevated temperature with hydrogen and oxygen in a silicon tetrachloride is the silica powder which is 5-500nm, and, as for the particle silica compounded by the gaseous-phase method, what has a diameter of a primary particle 50nm or less especially in this invention is usually desirable in respect of glossiness. Although current marketing is carried out as such a gaseous-phase method silica, as an example, various kinds of Aerosil of Japanese Aerosil corresponds.

[0022] Cation denaturation of the front face may be carried out, and the silica compounded by the above-mentioned gaseous-phase method may be processed by aluminum, calcium, Mg, Ba, etc., and may carry out hydrophobing of surface [ a part of ].

[0023] Although the particle size of the above-mentioned inorganic particle can also use anythings, in the viewpoint of being easy to obtain viscosity, i.e., the coating liquid from which viscosity changes a lot to the temperature change of coating liquid, as shown in this invention, 1 micrometer or less has desirable mean particle diameter, and especially its 0.2 micrometers or less are desirable.

[0024] Especially although especially the minimum of particle size is not limited, 6nm or more is desirable [ a minimum ] 3nm or more in general from a viewpoint on manufacture of a particle.

[0025] In the above, the mean particle diameter of a non-subtlety particle observes the cross section and front face of the particle itself or an opening layer with an electron microscope, and is called for as the arithmetic average value (individual number average) in quest of the particle size of the particle of 100 arbitration. The particle size of each [ here ] is expressed with the diameter when assuming a circle equal to the projected area.

[0026] From the viewpoint of being easy to maintain the viscosity also in case it is easy to obtain the coating liquid in which the viscosity of this invention is shown and it is applied, the content in the drainage system spreading constituent of the above-mentioned inorganic particle is 3 - 20 % of the weight in general, and its 5 - 15 % of the weight is especially desirable.

[0027] Although the drainage system spreading constituent concerning this invention contains a hydrophilic binder preferably, they are polyvinyl alcohol and its derivative, polyalkylene oxide, a polyvinyl pyrrolidone, hydroxyethyl cellulose, a carboxymethyl cellulose, a pullulan, casein, a dextran, etc. as the binder concerned, and is polyvinyl alcohol among these especially preferably.

[0028] Although vinyl acetate is hydrolyzed among the polyvinyl alcohol which can be used by this invention and it is obtained, 300 or more things are preferably used for average degree of polymerization, and the thing of 1000-4000 is preferably used especially for average degree of polymerization by the case. Whenever [ saponification ] has 70 - 100% of desirable thing, and 80 - 99.5% of especially its thing is desirable.

[0029] Moreover, denaturation polyvinyl alcohol, such as anion denaturation polyvinyl alcohol which has the polyvinyl alcohol which carried out cation denaturation of the end other than the usual polyvinyl alcohol obtained by hydrolyzing vinyl acetate, and an anionic radical, is also contained in the polyvinyl alcohol derivative which can be used by this invention.

[0030] It is polyvinyl alcohol which has the 1-3rd class amino group which is indicated by JP,61-10483,A, for example, and the 4th class ammonium in the principal chain of the above-mentioned polyvinyl alcohol, or a side chain as cationic polyvinyl alcohol, and is obtained by saponifying the copolymer of the ethylenic unsaturated monomer and vinyl acetate which have a cationic radical.

[0031] As an ethylenic unsaturated monomer which has a cationic radical For example, TORIMECHIRU-(2-acrylamide-2-methylpropyl) ammoniumchloride, TORIMECHIRU-(3-acrylamide-3-methylbutyl) ammoniumchloride, N-vinyl imidazole, N-vinyl-2-methylimidazole, N-(3-dimethylaminopropyl) methacrylamide, Hydroxyethyl trimethylammonium chloride, TORIMECHIRU-(3-methacrylamide propyl) ammoniumchloride, N-(1 and 1-dimethyl-3-dimethylaminopropyl) acrylamide, etc. are raised.

[0032] the ratio of the cation denaturation radical content monomer of cationic polyvinyl alcohol -- vinyl acetate -- receiving -- 0.1-10-mol % -- it is 0.2-5-mol % preferably.

[0033] The copolymer of vinyl alcohol which is indicated by the polyvinyl alcohol and JP,61-237681,A which have an anionic radical anion denaturation polyvinyl alcohol is indicated to be by JP,1-206088,A, and JP,3-307979,A, and the vinyl compound which has a water-soluble radical, and the denaturation polyvinyl alcohol which has a water-soluble radical which is indicated by JP,7-285265,A are raised.

[0034] Moreover, the polyvinyl alcohol derivative which added a polyalkylene oxide radical which is indicated by JP,7-9758,A to a part of vinyl alcohol as Nonion denaturation polyvinyl alcohol, for example, the block copolymer of the vinyl compound and polyvinyl alcohol which have the hydrophobic radical indicated by JP,8-25795,A, etc. are mentioned.

[0035] Polyvinyl alcohol and its derivative can also use two or more kinds together for polymerization degree, the class difference in denaturation, etc.

[0036] Although the content in the inside of the drainage system spreading constituent concerning this invention of the above-mentioned polyvinyl alcohol may change with the class of polyvinyl alcohol, the class of non-subtlety particle, amounts, etc. extensively, it is 0.1 - 10 % of the weight in general, and especially its 0.3 - 5 % of the weight is desirable.

[0037] Moreover, in the viewpoint that a minimum tends to obtain the coat whose weight ratio 3 is desirable and is not weak in the point of being easy to adjust the ratio to the polyvinyl alcohol of a non-subtlety particle to the range of the liquid viscosity concerning this invention, the weight ratio 10 of an upper limit is desirable.

[0038] Although the drainage system spreading constituent concerning this invention contains polyvinyl alcohol as a main binder, if it is within the limits of the liquid viscosity of this invention, other hydrophilic binders can be used together.

[0039] As such a hydrophilic binder, gelatin, polyethylene oxide, a polyvinyl pyrrolidone, polyacrylic acid, polyacrylamide, polyurethane, a dextran, a dextrin, a carrageenan, an agar, a pullulan, a water-soluble polyvinyl butyral, hydroxyethyl cellulose, a carboxymethyl cellulose, etc. are mentioned.

[0040] As for especially those hydrophilic binders, it is preferably desirable that it is 10 or less % of the weight 20 or less % of the weight in general to polyvinyl alcohol.

[0041] As for the drainage system spreading constituent concerning this invention, it is desirable to contain a boric acid or its salt in the viewpoint of being easy to adjust to the viscosity range concerning this invention. A boric acid or its salt is the oxygen acid which uses a boron atom as a neutral atom, and its salt, and those salts, such as orthoboric acid, metaboric acid, hypoboric acid, tetraboric acid, and 5 boric acids, are specifically contained.

[0042] Although the amount of a boric acid or its salt used is chosen from extensive inside with the concentration of polyvinyl alcohol, other components, for example, non-subtlety particle, in coating liquid, pH, etc., it is desirable that it is 1 - 60 % of the weight in general to polyvinyl alcohol, and its 5 - 40 % of the weight is still more desirable.

[0043] In order to realize the viscosity range concerning this invention, it is a very desirable mode that a non-subtlety particle, polyvinyl alcohol and a boric acid, or its salt is included.

[0044] Although the viscosity range concerning this invention, i.e., the reason a low-temperature viscosity rise takes place rapidly, cannot be solved completely, the thing and those [ this invention ] who are probably based on the following reasons think.

[0045] That is, weak coupling etc. becomes entangled intricately comparatively, strong association between molecules is comparatively carried out at low temperature, a viscosity rise takes place, and it is thought between the hydrogen bond between the oxygen atom of a non-subtlety particle or a hydrogen atom, and the hydrogen atom of the hydroxyl group of polyvinyl alcohol or an oxygen atom and polyvinyl alcohol and a boric acid, or its salt that this association becomes weak in the state of an elevated temperature, and viscosity falls.

[0046] Generally viscosity rises by making a drainage system spreading constituent into low temperature. When it stands on an assumption which was mentioned above, in order to enlarge low temperature / hot viscosity difference 1) A silica with a small particle size is contained [ containing a non-subtlety particle, for example, a silica especially ], 2) Means, such as lessening the amount of containing using the hydrophilic binder which interacts with a non-subtlety particle, 3 boric acid, or a cross linking agent like the salt, and the mineral salt which carries out

4 content (it being made not to contain mineral salt), are raised.

[0047] And in order to make it the viscosity in 15 degrees C become 20 or more times with a viscosity of 40 degrees C like this invention, it is desirable especially to include a non-subtlety particle, polyvinyl alcohol and boric acid, or its salt in the drainage system spreading constituent concerned at least. Furthermore, it is effective to enlarge the weight ratio of a non-subtlety particle / polyvinyl alcohol, for enlarging low temperature / hot viscosity difference like this invention.

[0048] Moreover, since the effect to the hydration degree of the hydroxyl group of the surface charge condition of a non-subtlety particle or polyvinyl alcohol or dissociation of a boric acid is comparatively large, in order to obtain the drainage system spreading constituent concerning this invention, it is desirable [ pH of a drainage system spreading constituent ] that it is the range of pH 3.5-6.0. In the viewpoint that it is suitable in order to show the viscosity width of face in the elevated temperature and low temperature concerning this invention, a minimum pH 3.5 is desirable, and it is still more desirable that it is an upper limit pH 5.5 in the viewpoint that the interaction in coating liquid does not change too much strongly, and it is hard to cause condensation, and gelation cannot occur easily in the state of an elevated temperature.

[0049] As an approach of adjusting the viscosity of the drainage system spreading constituent concerning this invention, adding the organic solvent and polymeric latex of a surfactant and a water miscibility is mentioned. Among these, a surfactant and a water miscibility organic solvent are used as a means which lowers the viscosity of a spreading constituent, and polymeric latex is used as a means to raise viscosity.

[0050] When a drainage system spreading constituent is cationicity and a cationic surface active agent or a nonionic surface active agent is [ a drainage system spreading constituent ] anionic, as for a surface active agent, a nonionic surface active agent or an anionic surface active agent is used. Although the addition of a surfactant changes extensively to the viscosity which should be adjusted, they are per [ 0.01-10g ] 1l. of drainage system spreading constituents in general.

[0051] As a water miscibility organic solvent, polyols, such as amides, such as ester, such as ketones, such as alcohols, such as a methanol, ethanol, n-propanol, and i-propanol, an acetone, and a methyl ethyl ketone, ethyl acetate, and propyl acetate, and N.N-dimethylformamide, ethylene glycol, a diethylene glycol, and a glycerol, are mentioned.

[0052] The amount of the water miscibility organic solvent used is 0.1-20ml per 1l. of drainage system spreading constituents in general.

[0053] Polymeric latex can use various latexes, such as a silicone oil, an acrylic latex, and an urethane system latex.

[0054] Suitable conditions to maintain the ratio of the viscosity in an elevated temperature and the viscosity in low temperature out of a means which was expressed above are chosen.

[0055] 50 or more times of viscosity [ in / in viscosity / in / preferably / on the point that the effectiveness of this invention can be more notably acquired with the viscosity control means of the above / the drainage system spreading constituent concerning this invention / although it is the viscosity of 10 - 100cp in 40 degrees C, and the viscosity in 15 degrees C is chosen so that it may be the 20 or more times, and / 15 degrees C / 40 degrees C ] -- further -- desirable -- 100 or more times -- it is . In here, viscosity is measured by the Brookfield viscometer.

[0056] The manufacture approach of the record form using the drainage system spreading constituent concerning this invention can be applied to various applications. For example, when applying the layers (for example, a photosensitive layer, the middle class, a protective layer, an undercoating layer, etc.) of the arbitration of various kinds of silver halide photosensitive material to coincidence, applying two or more ink absorbing layers of an ink jet record form to coincidence, applying two or more acceptance layers of a thermal-ink-transfer-printing record form to coincidence, and applying two or more coloring matter television layers of diffusion transfer mold photosensitive material to coincidence, it can apply. When it applies to coincidence spreading of two or more ink absorbing layers of an ink jet record form especially, it is especially used preferably from the spreading layer of the thick film which has high ink absorptivity with the high voidage which the good spreading film surface was obtained and suppressed the failure defect being obtained.



[0057] It is desirable, in order that a cation mordant may improve the water resisting property and opposite humidity after printing also while being able to add various kinds of additives other than the above to the drainage system spreading constituent concerning this invention. Although the polymer mordant which has the 1st, the 2 or 3rd class amino group, or a quarternary-ammonium-salt radical as a cation mordant is used, since there being little discoloration by the passage of time and light-fast degradation and the mordanting ability of a color are high enough, the polymer mordant which has a quarternary-ammonium-salt radical is desirable.

[0058] A desirable polymer mordant is obtained as the homopolymer of the monomer which has the above-mentioned quarternary-ammonium-salt radical, a copolymer with other monomers, or a condensation polymerization object.

[0059] In addition to the above, for example, an ultraviolet ray absorbent given in JP,57-74193,A, 57-87988, and 62-261476, JP,57-74192,A, 57-87989, 60-72785, The tenebrescence inhibitor indicated by 61-146591, JP,1-95091,A, 3-13376, etc., An anion, a cation or the various surfactants of non-ion, JP,59-42933,A, The fluorescent brightener indicated by 59-52689, 62-280069, 61-242871, JP,4-219266,A, etc., Various well-known additives, such as lubricant, such as a defoaming agent and a diethylene glycol, antiseptics, a thickener, an antistatic agent, and a mat agent, can be made to contain.

[0060] Next, how to carry out coincidence spreading of the drainage system spreading constituent of this invention is explained. Although any well-known things can be used for the base material used, as for desirable one, a base material does not absorb the moisture of a spreading constituent.

[0061] As such a non-absorptivity base material, for example A polyester system film, A diacetate system film, a triacetate system film, an acrylate system film, A polycarbonate system film, a polyvinyl chloride system film, a polyimide system film, The resin covering paper which has the bright film which consists of ingredients, such as cellophane and celluloid, or the polyolefin resin enveloping layer which added white pigments at least to one side of a base paper (the so-called RC paper), Translucent or non-\*\*\*\*\*, such as the so-called White pet which comes to add white pigments, such as titanium oxide and a barium sulfate, are in polyethylene terephthalate.

[0062] In enforcing the manufacture approach of this invention using the above-mentioned base material, it is the purposes, such as enlarging bond strength between the front face of the base material concerned, and a spreading layer, and it is desirable to perform corona discharge treatment, undercoating processing, etc. to a base material. Furthermore, since the record form manufactured by this invention does not necessarily need to be colorlessness, the colored base material can also be used.

[0063] The base material preferably used in operation of this invention is a paper base material which covered both sides of a transparence polyester film, opaque polyester film, and opaque polyolefin resin film and a stencil paper base material with polyethylene.

[0064] With polyethylene, especially a desirable thing is the paper base material which covered both sides, and is explained in detail below about this.

[0065] The stencil paper used for a paper base material uses wood pulp as the main raw material, and, in addition to wood pulp, paper making is carried out using synthetic fibers, such as synthetic pulps, such as polypropylene, or nylon, and polyester, if needed. Although both LBKP, LBSP, NBKP, NBSP LDP and NDP LUKP and NUKP can be used as wood pulp, it is desirable to use more many [ for a staple fiber ] LBKP, NBSP(s), LBSP(s), and NDP(s) and LDP(s). However, the ratio of LBSP and/or LDP has 10 % of the weight or more and 70 desirable % of the weight or less.

[0066] The pulp of the above-mentioned pulp which chemical pulp with few impurities (sulfate pulp and sulfite pulp) was used preferably, and performed bleaching processing, and raised the whiteness degree is also useful.

[0067] Hara Kaminaka can add suitably flexible-ized agents, such as moisture hold-back agents, such as paper reinforcing agents, such as white pigments, such as sizing compounds, such as a higher fatty acid and an alkyl ketene dimer, a calcium carbonate, talc, and titanium oxide, starch, polyacrylamide, and polyvinyl alcohol, a fluorescent brightener, and polyethylene glycols, a



dispersant, and the 4th class ammonium, etc.

[0068] The freshness of the pulp used for paper making has desirable 200-500ml by convention of CSF, and 30 - 70% has the desirable sum of 24-mesh residue weight % and weight % of the 42-mesh residue as which the fiber length after beating is specified to JIS-P -8207. In addition, as for weight % of the four-mesh residue, it is desirable that it is 20 or less % of the weight.

[0069] The weighing capacity of stencil paper has 30-desirable 250g, and 50-especially its 200g are desirable. The thickness of stencil paper has desirable 40-250 micrometers.

[0070] After a paper-making phase or paper making, calender processing of the stencil paper can be carried out, and it can also give the Takahira slippage. A stencil paper consistency has common 0.7 - 1.2 g/m<sup>2</sup> (JIS-P -8118). Furthermore, stencil paper stiffness has 20-desirable 200g on the conditions specified to JIS-P -8143.

[0071] A surface sizing compound may be applied to a stencil paper front face, and said sizing compound which can carry out the Hara Kaminaka addition, and the same sizing compound can be used as a surface sizing compound.

[0072] When measured by the hot water extraction method specified by JIS-P -8113, as for pH of stencil paper, it is desirable that it is 5-9.

[0073] Mainly although the polyethylene which covers a stencil paper front face and a rear face is the polyethylene (LDPE) of a low consistency, and/or polyethylene (HDPE) of high density, a part of other LLDPE(s), polypropylene, etc. can be used for it.

[0074] As for especially the polyethylene layer by the side of a spreading layer, what added the titanium oxide of a rutile or an anatase mold in polyethylene as widely performed by the printing paper for photographs, and improved opacity and a whiteness degree is desirable. A titanium oxide content is 4 - 13 % of the weight preferably three to 20% of the weight in general to polyethylene.

[0075] polyethylene covering paper can also use the thing in which a mat side which performs the so-called mold attachment processing and is acquired in the usual printing paper for photographs, and the silky surface were formed, by this invention, in case melting push appearance also of also using as glossy paper is carried out and it coats polyethylene on a stencil paper front face.

[0076] After preparing the thickness and the back layer of a drainage system spreading constituent, the amount of the polyethylene used of the front flesh side of stencil paper is damp and range whose 20-40-micrometer and back layer side the polyethylene layer of the side which applies the drainage system spreading constituent of this invention is 10-30 micrometers, although it is chosen so that the curl under highly humid may be optimized.

[0077] Furthermore, as for the above-mentioned polyethylene covering paper base material, it is desirable to have the following properties.

[0078] 1) 2-30kg and a longitudinal direction have [ a lengthwise direction ] desirable 1-20kg by the reinforcement specified by :JIS-P -8113 in hauling strength.

[0079] 2) Tear reinforcement : 10-200g, and a longitudinal direction have [ a lengthwise direction ] 20-desirable 200g by the convention approach by JIS-P -8116.

[0080] 3) Compressibility  $\geq 103$  kgf/cm<sup>2</sup> surface Beck smoothness : although 20 seconds or more are desirable as a glossy surface on the conditions specified to JIS-P-8119, in the so-called mold attachment article, you may be less than [ this ].

[0081] 5) Opacity : especially 15% or less has the desirable permeability in the beam of light of a visible region 20% or less at the Measuring condition of straight-line light incidence / diffused-light transparency conditions.

[0082] Although the manufacture approach of this invention carries out coincidence spreading of the two or more drainage system spreading constituents concerning this invention on a base material, all well-known approaches that are used as this approach in the case for example, of the sensitive-material manufacture for photographs are applicable to this invention. moreover, as long as it carries out coincidence spreading more than two-layer in the same field of a base material, how many layers are sufficient, as long as the layer more than two-layer [ which carries out coincidence spreading ] is a layer of an opening mold, other than this, it may be alike and both the layers that are not opening molds may be applied to coincidence. At this time, about the

layer of two or more opening molds, the ratio of 15-degree-C viscosity and 40-degree-C viscosity may be the same, and may differ.

[0083] All layer coincidence spreading of the record form manufacture approach of this invention that applies more than two-layer to coincidence, and substitutes all hydrophilic binder layers for one spreading also especially in it is desirable. And preferably, after that, since cooling solidification (the so-called set) is carried out, moisture is evaporated and it dries. The extrusion coat method spreading uses a hopper the curtain coat method or given in U.S. Pat. No. 2,681,294 preferably is used preferably. Under the present circumstances, it is desirable from a viewpoint of productivity to heat on the conditions to the condition which the set coating liquid does not remelt at the time of desiccation.

[0084] It is usually 25-60 degrees C, coating liquid temperature has desirable 35-50 degrees C, and it is desirable especially to use the liquid which is 36-48 degrees C. The film surface temperature after spreading passes [ cooling ] 20 degrees C or less of fixed time amount (preferably above for 5 seconds) cooling zones, as cooling becomes 15 degrees C or less preferably. It is desirable not to spray a not much strong wind at this cooling time in the viewpoint of suppressing liquid Yori's generating.

[0085] As for subsequent desiccation, it is desirable to carry out by spraying a wind 20 degrees C or more from the point of obtaining a uniform film surface. After spraying especially a wind 20 degrees C or more, it is desirable to raise the temperature of a wind gradually. Although the drying time is based also on humid thickness, carrying out especially within 5 minutes is in general desirable less than 10 minutes.

[0086] Although the humid thickness to apply changes by the desiccation thickness made into the purpose, and it is desirable, 70-250 micrometers and a spreading rate are large in humid thickness or desiccation capacity and it depends 50-300 micrometers in general, it is a part for 20-500m/preferably by 10-1000m/in general.

[0087] In order to raise prevention and an ink imprint with [ which goes away when it lays on top of the side and the opposite side which apply the drainage system spreading constituent concerning this invention immediately after curl prevention or printing ] \*\* further, it is desirable to prepare the back layer of various classes.

[0088] Although the configuration of a back layer changes also with the class of base material, thickness, and the configuration and thickness on a side front, generally a hydrophilic binder and a hydrophobic binder are used. The range of the thickness of a back layer is usually 0.1-10 micrometers.

[0089] Moreover, it adheres to a back layer as other record forms, and the surface roughening of the front face can be carried out to prevention, note nature amelioration, and a pan for conveyance nature amelioration within an ink jet recording device. The organic or inorganic particle whose particle size is 2-20 micrometers is preferably used for this purpose.

[0090] These back layers may be prepared beforehand, and after they apply the drainage system spreading constituent concerning this invention, they may be prepared.

[0091]

[Example] Although the example of this invention is given and explained below, this invention is not limited to these examples. In addition, unless % has a notice especially in an example, oven-dry-weight % is shown.

[0092] After the mean diameter of an example 1 [production of the silica part water spray a] primary particle carried out suction distribution of the gaseous-phase method silica (Japanese Aerosil Industries make: A300) 125kg which is about 0.007 micrometers at the room temperature into 620l. pure water using the jet stream inductor mixer TDS by Mitamura Riken Industries, pure water was added and 694l. was made to the whole quantity (pH2.5).

[0093] [Production of silica dispersion liquid A] The cationic polymer P-1 was added stirring in a 25-30-degree C temperature requirement to water-solution B(pH=2.7 and 2g of defoaming agents SN381 made from SANNOBUKO, Inc. are contained)110l. which contains 16 % of the weight, 5 % of the weight of n-propanol, and ethanol for 450l. of the silica part water spray a 2% of the weight. Next, 42l. (pH7.3) of thing C fluid which mixed the 3 % of the weight water solution of way acids and the 3 % of the weight water solution of way sand by 1:1 was added gradually,

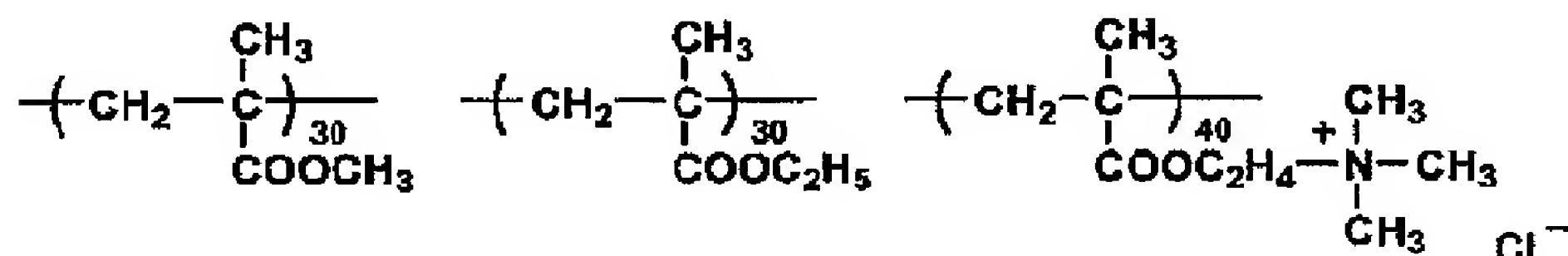
stirring into the mixture of said silica part water spray a and water solution B.

[0094] Subsequently, it distributed by the pressure of 500kg/cm<sup>2</sup> using the high-pressure homogenizer by Sanwa Industries, and with pure water, the filter (30 micrometers of filtration accuracies) of TCP[ by ADVANTEC Oriental incorporated company ]-30 type was used, finishing and this were filtered in the 630l. of whole quantity, and almost transparent silica dispersion liquid A were obtained.

[0095]

[Formula 1]

P-1



[0096] [Preparation of the coating liquid for record form 1 creation] In order to create the ink jet record form which has the opening mold recording layer of a two-layer configuration using the above-mentioned silica dispersion liquid A, the two following kinds of coating liquid was prepared (the amount per 1l. of coating liquid showed each value.). Moreover, it added in the order indicated respectively.

[0097]

Coating liquid for the 1st layer: 1-1 Silica dispersion liquid A 580ml Polyvinyl alcohol (PVA203 by Kuraray Co., Ltd.) 10% water solution 5ml Polyvinyl alcohol (PVA235 by Kuraray Co., Ltd.) 5% water solution 250ml Fluorescent brightener dispersion liquid (following) 30ml Latex dispersion liquid (AE803 by Showa High Polymer Industries) 20ml 5% water solution of the fading inhibitor -1 (following) 20ml Ethanol 8.5ml pure water (1000ml is made to the whole quantity)

The viscosity in 40 degrees C of 1-obtained 1 and 15 degrees C was measured, and the value shown in Table 1 was acquired.

[0098]

Coating liquid for the 2nd layer: 1-2 Silica dispersion liquid A 570ml Polyvinyl alcohol (PVA203 by Kuraray Co., Ltd.) 10% water solution 5ml Polyvinyl alcohol (PVA235 by Kuraray Co., Ltd.) 5% water solution 230ml 20 ml saponin water solution (20%) Silicone emulsion (Dow Corning Toray Silicone, Inc. make BY-22-839) 45ml 5% water solution of the fading inhibitor -1 (following) 20ml Ethanol 11ml Methyl methacrylic-acid system latex (the total product made from \*\*\*\*\*, Inc.: MX-1000)

43ml Pure water (1000ml is made to the whole quantity)

The viscosity in 40 degrees C of 1-obtained 2 and 15 degrees C was measured, and the value shown in Table 1 was acquired.

[0099] Next, by changing the volume of the silica dispersion liquid A in the coating liquid 1-1 for the 1st layer and the coating liquid 1-2 for the 2nd layer which are used for creation of the record form 1, and the addition of polyvinyl alcohol (PVA235) The weight ratio of a silica to polyvinyl alcohol was changed, except making it become the viscosity shown in Table 1, it was made the same as creation of 1-1 and 1-2, and 2-1, 2-2 to 6-1, and 6-2 were created. (In addition, 4-1 and 4-2 use the same thing as 1-1 and 1-2.)

(Creation of the fluorescent brightener dispersion liquid used for the coating liquid for the 1st layer) It added in 100l. (4kg and 2kg of cationic polymers P-1 are contained for a saponin) of 3% acid-treatment gelatin water solutions, emulsification distribution of the liquid which carried out the heating dissolution of 600g (UVITEX-alumnus) of oil solubility fluorescent brighteners by Ciba-Geigy, Inc. and the di-isodecyl phthalate 12kg at 25l. of ethyl acetate was carried out with the high-pressure homogenizer, and 140l. was made to the whole quantity with pure water.

[0100] (Creation of 5% water solution of the fading inhibitor -1 used for the 1st and the coating liquid for two-layer) 5g of N and N-disulfo ethyl hydroxylamine-disodium salts is dissolved in the 90ml water containing 3g (P-1) of cationic polymers, and 100ml is made to the whole quantity.



[0101] <Creation of the record form 1> Paper base material which covered both sides with polyethylene (thickness contains 13% of the weight of anatase mold titanium oxide to polyethylene in the polyethylene of an ink absorbing layer side by 220 micrometers.) The gelatin of about 30 mg/m<sup>2</sup> is painted on the front-face side which applies an opening mold recording layer as an undercoating layer after corona discharge treatment. Finishing [ side / rear-face / corona discharge ]. Two-layer coincidence spreading of each coating liquid was carried out with the two-layer type slide hopper at 40 degrees C so that the coating liquid for record form 1 creation might be used upwards and it might become the order of the 1st layer (55 micrometers of humid thickness), and the 2nd layer (35 micrometers of humid thickness) upwards.

[0102] After cooling for 20 seconds in the cooling zone kept at 0 degree C immediately after spreading, by the 25-degree C wind (15% of relative humidity) For 60 seconds, Junji Hazama desiccation was carried out for 60 seconds by the 50-degree C wind (relative humidity is 25%) for 60 seconds by the 45-degree C wind (relative humidity is 25%), gas conditioning was carried out for 2 minutes under the ambient atmosphere 20-25 degrees C and whose relative humidity are 40 - 60%, the sample was rolled round, and the record form 1 was created.

[0103] <Creation of the record forms 2, 3, 5, and 6> Except changing to the coating liquid for record form 1 creation used by creation of the record form 1, and using the record forms 2, 3, and 5 and the coating liquid for 6 creation, it was made the same as creation of the record form 1, and the record forms 2, 3, 5, and 6 were created.

[0104] <Creation of the record form 4> It changed to the process which carried out two-layer coincidence spreading in creation of the record form 1, and except one layer having applied and dried at a time by the wire bar coat method in the order of the 1st layer and the 2nd layer (it having been indicated in Table 1 as "stratification spreading"), it was made the same as creation of the record form 1, and the record form 4 was obtained.

[0105] [Preparation of the coating liquid for record form 7 creation] In order to create the ink jet record form which has the opening mold recording layer of 4 lamination using the above-mentioned silica dispersion liquid A, the four following kinds of coating liquid was adjusted (the amount per 1l. of coating liquid showed each value.). Moreover, it added in the order indicated respectively.

[0106]

Coating liquid for the 1st layer: 7-1 Silica dispersion liquid A 580ml Polyvinyl alcohol (PVA203 by Kuraray Co., Ltd.) 10% water solution 5ml Polyvinyl alcohol (PVA235 by Kuraray Co., Ltd.) 5% water solution 250ml Fluorescent brightener dispersion liquid (following) 30ml Latex dispersion liquid (AE803 by Showa High Polymer Industries) 20ml 5% water solution of the fading inhibitor -1 (following) 20ml Ethanol 8.5ml pure water (1000ml is made to the whole quantity)

The viscosity in 40 degrees C of 7-obtained 1 and 15 degrees C was measured, and the value shown in Table 1 was acquired.

[0107]

Coating liquid for the 2nd layer: 7-2 Silica dispersion liquid A 620ml Polyvinyl alcohol (PVA203 by Kuraray Co., Ltd.) 10% water solution 5ml Polyvinyl alcohol (PVA235 by Kuraray Co., Ltd.) 5% water solution 270ml Fluorescent brightener dispersion liquid (following) 30ml 5% water solution of the fading inhibitor -1 (following) 20ml Ethanol 3.5ml Pure water (1000ml is made to the whole quantity)

The viscosity in 40 degrees C of 7-obtained 2 and 15 degrees C was measured, and the value shown in Table 1 was acquired.

[0108]

Coating liquid for the 3rd layer: 7-3 Silica dispersion liquid A 630ml Polyvinyl alcohol (PVA203 by Kuraray Co., Ltd.) 10% water solution 5ml Polyvinyl alcohol (PVA235 by Kuraray Co., Ltd.) 5% water solution 280ml Fluorescent brightener dispersion liquid (following) Ten ml 5% water solution of the fading inhibitor -1 (following) 20ml Ethanol 10ml Pure water (1000ml is made to the whole quantity) The viscosity in 40 degrees C of 7-obtained 3 and 15 degrees C was measured, and the value shown in Table 1 was acquired.

Coating liquid for the 4th layer (the maximum upper layer): 7-4 Silica dispersion liquid A 570ml Polyvinyl alcohol (PVA203 by Kuraray Co., Ltd.) 10% water solution 5ml Polyvinyl alcohol

(PVA235 by Kuraray Co., Ltd.) 5% water solution 230ml Saponin water solution (20%) 20ml Silicone emulsion (Dow Corning Toray Silicone, Inc. make BY-22-839) 45ml 5% water solution of the fading inhibitor -1 (following) 20ml Ethanol 11ml Methyl methacrylic-acid system latex (the total product made from \*\*\*\*\*, Inc.: MX-1000) 43ml Pure water (1000ml is made to the whole quantity)

The viscosity in 40 degrees C of 7-obtained 4 and 15 degrees C was measured, and the value shown in Table 1 was acquired.

[0109] Next Except making it become the viscosity which the volume of the silica dispersion liquid A in the coating liquid 7-1 for the 1st layer used for record form 7 creation, the coating liquid 7-2 for the 2nd layer, the coating liquid 7-3 for the 3rd layer, and the coating liquid 7-4 for the 4th layer and the addition of polyvinyl alcohol (PVA235) are changed, and is shown in Table 1, 7-1, It was made the same as creation of 7-2, 7-3, and 7-4, and 9-1, 9-2, 9-3, and 9-4 were created. In addition, 8-1, 8-2, 8-3, and 8-4 used the same thing as 7-1, 7-2, 7-3, and 7-4.

[0110] (Creation of the fluorescent brightener dispersion liquid used for the 1st, 2, and the coating liquid for three layers) It added in 100l. (4kg and 2kg of cationic polymers P-1 are contained for a saponin) of 3% acid-treatment gelatin water solutions, emulsification distribution of the liquid which carried out the heating dissolution of 600g (UVITEX-alumnus) of oil solubility fluorescent brighteners by Ciba-Geigy, Inc. and the di-isodecyl phthalate 12kg at 25l. of ethyl acetate was carried out with the high-pressure homogenizer, and 140l. was made to the whole quantity with pure water.

[0111] (Creation of 5% water solution of the fading inhibitor -1 used for the 1st, 2 and 3, and the coating liquid for four layers) 5g of N and N-disulfo ethyl hydroxylamine-disodium salts is dissolved in the 90ml water containing 3g (P-1) of cationic polymers, and 100ml is made to the whole quantity.

[0112] <Creation of the record form 7> Paper base material which covered both sides with polyethylene (thickness contains 13% of the weight of anatase mold titanium oxide to polyethylene in the polyethylene of an ink absorbing layer side by 220 micrometers.) The gelatin of about 30 mg/m<sup>2</sup> is painted on the front-face side which applies an opening mold recording layer as an undercoating layer after corona discharge treatment. Finishing [ side / rear-face / corona discharge ]. Four-layer coincidence spreading of each coating liquid was carried out with the four-layer type slide hopper at 40 degrees C so that the coating liquid for record form 7 creation might be used upwards and it might become the order of the 1st layer (55 micrometers of humid thickness), the 2nd layer (55 micrometers of humid thickness), the 3rd layer (55 micrometers of humid thickness), and the 4th layer (35 micrometers of humid thickness) upwards.

[0113] After cooling for 20 seconds in the cooling zone kept at 0 degree C immediately after spreading, by the 25-degree C wind (15% of relative humidity) For 60 seconds, Junji Hazama desiccation was carried out for 60 seconds by the 50-degree C wind (relative humidity is 25%) for 60 seconds by the 45-degree C wind (relative humidity is 25%), gas conditioning was carried out for 2 minutes under the ambient atmosphere 20-25 degrees C and whose relative humidity are 40 - 60%, the sample was rolled round, and the record form 7 was created.

[0114] <Creation of the record form 8> It changed to the process which carried out four-layer coincidence spreading in creation of the record form 7, and except one layer having applied and dried at a time by the wire bar coat method in the order of the 1st layer, the 2nd layer, the 3rd layer, and the 4th layer (Table 1 having shown "stratification spreading"), it was made the same as creation of the record form 7, and the record form 8 was obtained.

[0115] <Creation of the record form 9> Except changing to the coating liquid for record form 7 creation used by creation of the record form 7, and using the coating liquid for record form 9 creation, it was made the same as creation of the record form 7, and the record form 9 was created.

[0116] <Evaluation> Evaluation of a spreading film surface and evaluation of a failure defect are shown in Table 1 about the record forms 1-9.

[0117] (Evaluation of a spreading film surface) a spreading film surface has no nonuniformity by O:liquid Yori -- although it blows violently on O:edge partially and there is nonuniformity --

except [ its ] -- problem-less x: -- a surface minute crack and the number of a punctiform spreading defect were evaluated by viewing about the spreading sample of 100cm<sup>2</sup> which are not in the level which clear nonuniformity can use practically violently (evaluation of a failure defect).

[0118]

[Table 1]

記録用紙		塗布方法	塗布液	40℃粘度 c p	15℃粘度 c p	塗布 膜面	故障 欠陥
1	本発明	同時塗布	第2層1-2	52	12000	◎	0
			第1層1-1	52	12000		
2	本発明	同時塗布	第2層2-2	48	3500	◎	0
			第1層2-1	39	1100		
3	本発明	同時塗布	第2層3-2	39	1100	○	0
			第1層3-1	48	3500		
4	比較例	層別塗布	第2層4-2	52	12000	○	>1000
			第1層4-1	52	12000		
5	比較例	同時塗布	第2層5-2	48	3500	×	4
			第1層5-1	32	500		
6	比較例	同時塗布	第2層6-2	32	500	×	23
			第1層6-1	32	500		
7	本発明	同時塗布	第4層7-4	56	38000	◎	0
			第3層7-3	49	25000		
			第2層7-2	49	19000		
			第1層7-1	38	16000		
8	比較例	層別塗布	第4層8-4	56	38000	○	>1000
			第3層8-3	49	25000		
			第2層8-2	29	19000		
			第1層8-1	38	16000		
9	比較例	同時塗布	第4層9-4	32	500	×	8
			第3層9-3	32	500		
			第2層9-2	26	180		
			第1層9-1	26	180		

[0119] As shown in Table 1, it turns out that it has the good spreading film surface which failure with a bubble does not have, either, without the record form which carried out coincidence spreading using the coating liquid in which the viscosity concerning this invention is shown waking up liquid Yori.

[0120] Even if it is viscosity within the limits which the nonuniformity of the spreading film surface by liquid Yori, on the other hand, generates what is not viscosity within the limits concerning this invention even if it carries out coincidence spreading, and is applied to this invention, what carried out stratification spreading has produced the failure defect.

[0121]

[Effect of the Invention] It is high ink absorptivity and high drying, and the record form excellent in smooth nature without liquid Yori and nonuniformity which can obtain the image near photograph image quality can be manufactured.

[Translation done.]